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10/556,651	01/27/2006	Hideyoshi Horimai	211A 3789 PCT	6539

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EXAMINER	
CHANG, AUDREY Y	
ART UNIT	PAPER NUMBER
2872	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/556,651	HORIMAI, HIDEYOSHI	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *March 15, 24, 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,4-6,8-10,14-16,18,20,21,23,24 and 27-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2, 4-6,8-10,14-16,18,20,21, 23, 24 and 27-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 24, 2010 has been entered.

2. This Office Action is also in response to applicant's amendments filed on March 15 and March 24, 2010, that have been entered into the file.

3. By these amendments, the applicant has amended claims 2, 4, 8, 14, 18, 20, 23, 27, 29 and 30. has canceled claims 1, 3, 7, 11, 12-13, 17, 19, 22, 25, 26 and has newly added claims 31 and 32.

4. Claims 2, 4-6, 8-10, 14-16, 18, 20, 21, 23, 24, and 27-32 remain pending in this application.

5. The rejections of claims 1, 7, 17 and 22 under 35 USC 112, first paragraph, set forth in the previous Office Action concerning newly added matters are withdrawn in response to the cancellation of these claims.

6. The rejections of claims under 35 USC 112, first paragraph set forth in the previous Office Action are withdrawn in response to applicant's amendments.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2, 4-6, 8-10, and 14-16 and newly added claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Orlov et al (PN. 6,108,110) in view of the patent issued to Heanue et al (PN. 5,940,514).

Orlov et al teaches *a holographic storage and retrieval system* that is comprised of a *first* spatial light modulator (12, Figures 1-2) for spatial modulating a light from a source (16) and generating an *information* light or signal *light* (18), and a *reference generator* (28) for spatial modulating a light from a source (16) and generating a *reference* light (32). The signal or information light (18) and the reference light (32) are directed to an *object lens* (38) with the area of the reference light, at the entrance of the object lens, surrounds the area of the signal or information light. The reference light and the information or signal light intersects and interferes with each other at a location of a holographic disc or *information recording* layer (40) to record the interference pattern as a hologram, (please see column 4, line 19 to column 5, line 10). Orlov et al teaches that the reference light is modulated by a reference generator (28) that may include diffuser plate, phase plate, lenses or optical system, (please see column 4, lines 41-56) and the resulting reference light has a pattern or a plurality of patterns (arbitrarily divided) that radially surrounds the signal beam (as shown in Figure 2). The pattern or plurality of patterns of the modulation is or are radial patterns since the patterns can be represented by radial coordinate as radially expended from the center origin (point 24).

It is implicitly true that the spatial light modulator (12) for modulating the information or signal light implicitly has a plurality pixels. This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the reference generator (28), disposed at the periphery of the first spatial light modulator (12), comprises also a spatial light modulator. Orlov et al teaches that the reference generator (28) may include diffuser, lenses, phase plate or optical system (please see column 4, line 43, 49-51). **Heanue** et al in the same field of endeavor teaches that a diffuser or phase plate may be provided by *spatial light modulator* (PSLM, please see column 4, line 18, column 9, lines 1-10). It would

then have been obvious to one skilled in the art to use spatial light modulator as an alternative means to provide phase modulation or diffusing function as the phase plate or diffuser (i.e. the reference generator) for the benefit of using known means to provide the phase modulation and in additional to use spatial light modulator that allows the change and control of the modulation to the reference light.

With regard to claim 4-6, Orlov et al teaches that the first spatial light modulator (12, Figures 1-2) and the reference generator (28) are disposed at the same plane (22). Heanue et al teaches that the reference generator (such as phase plate or diffuser) may also be provided by spatial light modulator. This means one skilled in the art would have been motivated to make the reference generator and the first spatial light modulator with a single spatial light modulator with the peripheral regions provide the phase modulator or phase plate to generate the reference light and the central regions provide information modulation to provide the information or signal light for the benefit of using a single element to achieve both functions. With regard to claim 5, it is implicitly true that the spatial light modulator has a plurality of pixels that are capable of modulate the intensity, phases of the light. With regard to claim 6, since the reference light is traveling in a direction different from the axis of the optical system, this means the modulation to the reference beam has to be cyclic the same way as the instant application.

With regard to claims 8-10, the method for recording the hologram is implicitly included in the disclosure of the recording system and is rejected with respect to Orlov et al in combination with Heanue et al for the same reasons as stated for claim 2 above. Orlov et al teaches that the reference generator (28) may include various optical elements that are adapted to provide shift speckle multiplexing, (please see column 4, lines 45-46). The reference beam is also modulated to have a pattern or patterns that radially surround the signal beam (as shown in Figure 2). The pattern or plurality of patterns of the modulation is or are radial patterns since the patterns can be represented by radial coordinate as radially expended from the center origin (point 24). **With regard to claim 9**, the radially distributed reference lights have a virtual center coincide with the center of the information or signal light. **With regard to claim 10**, Orlov

et al teaches that the plurality of the reference lights generated by the reference generator can be adapted to provide shift speckle multiplexing. The shift speckle multiplexing involves using different phase-modulated reference light to record multiple holograms at different or overlapped recording locations. Although this reference does not teach explicitly about changing the virtual center angle between the plurality of the radial patterns, but if this changing of angles are referred to angular multiplexing scheme, then one skilled in the art must understand that the angular multiplexing scheme is well known in the art for the benefit of providing multiple recording.

With regard to claims 14-16, Orlov et al teaches that the first spatial light modulator (12, Figures 1-2) and the reference generator (28) are disposed at the same plane (22). Heanue et al teaches that the reference generator (such as phase plate or diffuser) may also be provided by spatial light modulator. This means one skilled in the art would have been motivated to make the reference generator and the first spatial light modulator with a single spatial light modulator with the peripheral regions provide the phase modulator or phase plate to generate the reference light and the central regions provide information modulation to provide the information or signal light for the benefit of using a single element to achieve both functions. With regard to claim 15, it is implicitly true that the spatial light modulator has a plurality of pixels that are capable of modulate the intensity, phases of the light. With regard to amended claim 16, the reference light taught by Orlov et al is deflected so that the traveling in direction that is different from the optical axis, the imparted modulation therefore has a cyclic pattern the same way as the instant application.

With regard to newly added claim 31, Orlov et al teaches that the reference generator comprise a diffuser plate which means the light modulated by it must have asymmetric pattern (diffusing patter generally is asymmetric). It can also impart a speckle pattern in the reference beam which implicitly means the reference light has an asymmetric light pattern with respect to the virtual center of the reference beam area, (please see column 4, lines 41-45). Speckle pattern is the resulted of interference

among the reference beams passing the diffuser and it is essentially an *intensity* pattern of the reference beam that has asymmetric nature.

With regard to newly added claim 32, Orlov et al, as shown in Figure 1 and 2, teaches that the reference light is traveling on the *peripheral* portion of the signal light (8), since the signal light is traveling on the optical axis of the object lens (38) this means the reference light is deflected from the optical axis of the optical system and is not traveling on the optical axis of the objective lens or the optical system.

9. Claims 18, 20-21, 23-24, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Orlov et al (PN. 6,108,110) in view of the patent issued to Heanue et al (PN. 5,940,514).

Orlov et al teaches, (with regard to claim 18), *a holographic storage and retrieval system* that is comprised of a *first* spatial light modulator (202, Figure 6) for spatial modulating a coherent light beam (210) from a *light source* and generating an *information* light or signal *light* (212), and a *reference generator* (214) for spatial modulating a coherent light (218) from the same light source as for the signal light beam and generating a *reference* light (220). The signal or information light (212) and the reference light (220) are directed to a hologram medium (204) for recording, in the recording mode, an interference pattern as hologram in the medium. In the retrieving mode, the coherent light (218) is modulated by the reference generator (214) to generate a reproducing reference light (220) that passes through an objective lens (216) onto the hologram recording medium (204) where the recorded interference pattern generates a reconstructed light beam (226) that serves as the return beam returned from the medium through the object lens to a detector (222) for detecting reconstructed signal information. Orlov et al teaches explicitly that the area of the reproducing reference light (220) on the entrance pupil of the object beam *surrounds* the area of the reconstructed light beam (226) from the medium, (please see column 8, line 41

to column 9, line 34). Noted since the *reconstructed* signal or information light is detected in the central region (222) of the reference beam generator, this means the area of the reference light on the object lens is surrounding the area of the signal or information light on the object lens.

It is implicitly true that the spatial light modulator (202) for modulating the information or signal light implicitly has a plurality pixels. This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the reference generator (214) comprises a spatial light modulator. Orlov et al teaches that the reference generator (28) may include diffuser, lenses, phase plate or optical system (please see column 4, line 43, 49-51). **Heanue** et al in the same field of endeavor teaches that a diffuser or phase plate may be provided by *spatial light modulator* (PSLM, please see column 4, line 18, column 9, lines 1-10). It would then have been obvious to one skilled in the art to use spatial light modulator as an alternative means to provide phase modulation or diffusing function as the phase plate or diffuser (i.e. the reference generator) for the benefit of using known means to provide the phase modulation and in additional to use spatial light modulator that allows the change and control of the phase modulation. The reference generator (214, Figure 6) which should have the same modulation from the diffuser plate, phase modulation, lens or optical systems as of (28) for recording must modulate the reference beam to have radial pattern or a plurality of radial patterns (arbitrarily divided) extended radially out from a center the center of the region 223, as shown in Figure 6), in order to retrieve the recorded hologram, since the reference generator has radial shape that the modulation pattern imposed by the reference generator can be presented by radial coordinates.

With regard to claims 20-21, it is implicitly true that the spatial light modulator comprise a plurality of pixels. With regard to amended claim 21, Orlov et al teaches reference light is deflected so that the traveling direction is different from the optical axis, the imparted modulation therefore must have cyclic pattern the same way as the instant application.

With regard to claims 23-24, the method for generating reconstructed signal light is implicitly included in the disclosures of the retrieval arrangement of Orlov et al in combination with the teachings of Heanue et al as stated in claim 18 above. With regard to claim 24, the center of the area of the reference light and the virtual center of the plurality of reference light are optical axes of the optical storage and retrieval system.

With regard to claim 27, the reference generator taught by Orlov et al in combination with the teachings of Heanue et al teaches that the intensity and phase of the reference light are spatially modulated.

With regard to claim 28, the traveling direction of the reference light deflected in a direction other that the optical axis direction the same way as the instant application, this means the imparted modulation to the reference bean must have cyclic pattern the same way as the instant application.

10. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Orlov et al and Heanue et al as applied to claims 2 and 18 above, and further in view of the Patent Application Publication by Horimai (UA 2002/0063342 A1).

The holographic recording and reproducing apparatus and method taught by Orlov et al in combination with the teachings of Heanue et al as described for claims 2 and 18 above have met all the limitations of the claims.

These references however do not teach to include a servo detection system. However it is rather well known in the art to use servo detection system for detecting servo tracking information. Horimai et al in the same field of endeavor teaches to include address servo areas in the hologram recording medium wherein the servo information can be retrieved by using a light source for generating servo light and a servo signal is detected by detector and servo information acquisition means, (please see Figure 4 and paragraphs [0135], [0136]). It would then have been obvious to one skilled in the art to apply the

teachings of Horimai et al to add a servo detection mechanism to the hologram recording and retrieving apparatus for the benefit of allowing servo address information can be implemented in the holographic memory to add the data detection.

Allowable Subject Matter

11. The following is a statement of reasons for the indication of allowable subject matter: of the prior art references considered none has disclosed an optical information recording or reproducing device that is comprised of a first spatial light modulator for generating the information light and a second spatial light modulator for generating a reference light such that the area of the reference light at the entrance pupil of the object lens is formed to surround the area of the information light and the reference light is spatially modulated into plurality of *discrete* radial patterns that are asymmetric to a virtual center point of the reference light area.

Response to Arguments

12. Applicant's arguments filed on March 15, 2010 have been fully considered but they are not persuasive..

13. In response to applicant's arguments which state that neither of the cited Orlov et al and Heanue et al references discloses the reference light is in radial pattern, the traveling direction is directed other than an optical axis and the radial pattern of the reference light is asymmetric with respect to a virtual center, the examiner respectfully disagrees and like to direct the applicant to the reasons for rejection stated above for the addressing these issues. The examiner wishes to also respond these issues in the following statements. The reference generator (28 and 228, Figures 1 and 6) of cited Orlov et al reference, which may include diffuser plate, phase plate, lenses or optical systems, which modulates the reference light to have a pattern that the area of the reference light surrounds the information light. The pattern can be represented by radial coordinates. In particularly, the generator (228) has a circular shape

which means the modulation pattern has to have radial pattern expends radially out from the area of the reference light. The reference light is propagated along the peripheral portions which is not traveling along the optical axis. This means the reference light is deflected away from the optical axis the same way as the instant application. Both the reference light of the cited Orlov et al reference and the instant application travel NOT along the optical axis. Furthermore, the diffuser plate would modulate the reference light in asymmetric manner or the pattern will be asymmetrical with respect to a virtual center point of the reference light area.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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